

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independents claims 1, 17 and 23 recite limitation “a plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at least one flexible membrane to form an integrated unit for attachment to the roofing surface”. “An integrated unit” is not clearly defined. The meets and bounds for “forming an integrated unit” cannot be determined.

Dependent claims 2-16, 18-22 and 24 are rejected because of their independent claims.

### ***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-2, 6-7, 9-13, 15-16 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Heckeroth (PGPub 20020129849).

Regarding claim 1, as seen in Figure 2, Heckeroth discloses an integrated photovoltaic roofing system for attachment to a roofing surface (roof deck 22), comprising at least one flexible membrane (24, See col. 5 lines 43-48) having a top surface and a bottom surface, the bottom surface for application to the roofing surface; a plurality of photovoltaic modules (10A, 10B) arranged side-by-side and attached to the top surface of the at least one flexible membrane (as seen in Figures 2 and 5A-F); at least one conduit (wire chase 240, as seen in Figure 6B) located at adjacent ends of the modules; and a plurality of electrical leads (lines from junction box 238 to wire chase 240 as seen in Figure 6B) in electrical connection with the modules and routed through the at least one conduit. As seen in Figures 2 to 3A-B, Heckeroth teaches the photovoltaic modules (10A, 10B) attached to each other by adhesive 20A in Figure 2 and to the flexible membrane (24) and roofing surface (22) by screw 32 and clamping strip 30. Therefore it is the Examiner's position that Heckeroth does teach the plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at

least one flexible membrane to form an integrated unit for attachment to the roofing surface.

Regarding claim 2, as seen in Figure 6B, Heckeroth discloses junction boxes (238 and 244), a connector device for connecting the electrical leads together. (See paragraphs [0049], [0086]-[0087])

Regarding claim 6, Heckeroth describes that the at least one conduit (wire chase 240) is located above the modules. (See Figure 6B)

Regarding claim 7, Heckeroth describes the conduit (wire chase 240) comprises at least one support member (220). (See Figure 6B)

Regarding claim 9, Heckeroth discloses an integrated roofing system as described in claim 1. Heckeroth also describes the flexible membrane (24) is a single sheet and can be made of material such as tarpaper, polymeric material, natural rubber. (See paragraph [0054]). Therefore it is the Examiner's position that the flexible membrane (24) comprises a single-ply membrane. In addition, single ply membrane is commonly used in roofing membrane.

Regarding claim 10, Heckeroth describes the flexible membrane is made of material such as polymeric material, natural rubber. (See paragraph [0055]). Therefore, the flexible membrane is a thermoplastic membrane sheet.

Regarding claim 11, as seen in Figures 1A and 10A-D, Heckeroth describes each elongated photovoltaic module 10 having a photovoltaic area 12, wherein the photovoltaic active area 12 has a plurality of discrete shaded areas. It is the Examiner's

position that each shaded area is a solar cell. Therefore Heckeroth does teach each photovoltaic module includes a plurality of solar cells.

Regarding claim 12, Heckeroth describes each module is flexible. (See paragraphs [0047]-[0048])

Regarding claim 13, as seen in Figures 1A, Heckeroth describes a body of polymeric material 18 encapsulating the photovoltaic area 12 and extend a greater distance beyond the photovoltaic area to seal the photovoltaic module. (See paragraphs [0050]-[0051]). The extending portion of body 18 is a seal along at least one edge between the at least one flexible membrane and at least one of the modules.

Regarding claim 15, Heckeroth describes the flexible membrane comprises a single sheet. (See paragraph [0054])

Regarding claim 16, as seen in Figures 5A-F, 6B and paragraphs [0073]-[0087], Heckeroth describes a first group includes modules arranged side-by-side on one side of the roof, and a second group includes modules arranged side-by-side on the other side of the roof as seen in Figures 5A-B. Two groups are arranged end-to-end at the ridge where the electrical leads (14, 16 as seen in Figure 1A) are located at adjacent ends of the modules of the first group and the second group.

Regarding claim 23, as seen in Figures 1A, 2, 5A-F, 6B, Heckeroth discloses an integrated photovoltaic roofing panel for attachment to a roofing surface, comprising a flexible membrane (24) having a top surface and a bottom surface, the bottom surface for application to the roofing surface; a plurality of elongated photovoltaic modules (10) arranged side-by-side and attached to the top surface of the at least one flexible

membrane; a plurality of electrical leads (14, 16) located at adjacent ends of the modules, each of the electrical leads having one end in electrical connection with one of the modules and having a connector (junction box 238) attached to a free end. (See paragraphs [0049], [0086]-[0087]). As seen in Figures 2 to 3A-B, Heckeroth teaches the photovoltaic modules (10A, 10B) attached to each other by adhesive 20A in Figure 2 and to the flexible membrane (24) and roofing surface (22) by screw 32 and clamping strip 30. Therefore it is the Examiner's position that Heckeroth does teach the plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at least one flexible membrane to form an integrated unit for attachment to the roofing surface.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Sasaoka et al. (US Patent 6462265).

Heckeroth discloses an integrated roofing system as described in claim 1, wherein one end of the electrical leads (14, 16) connect to a connector (terminal box). (See paragraph [0049]).

Heckeroth does not specifically teach that one end of the electrical leads soldered to the module.

Sasaoka et al. teach the electrical leads having one end soldered to a module (See Figure 16 and col. 24 lines 5-14)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth by soldering one end of electrical leads to the photovoltaic module as taught by Sasaoka, because it is a way to make an electrode lead-out unit. (See col. 24 lines 5-14).

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Sasaoka et al. (US Patent 6462265) and further in view of Yamawaki (US Patent 6268559).

Heckeroth and Sasaoka et al. disclose an integrated roofing system as described in claim 3.

Neither Heckeroth nor Sasaoka et al. teach one electrical lead with connectors attached to each end of electrical lead.

Yamawaki teaches one electrical lead (22) with connectors (22a, 24a) attached to each end of electrical lead. (See Figure 4 of Yamawaki).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth and Sasaoka et al. by providing connectors to each end of electrical leads as taught by Yamawaki et al, because it would lower possibility of wrong wiring and ease the work of connecting wires. (See col. 2 lines 45-51).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Wagner et al. (US Patent 5164020).

Heckeroth discloses an integrated roofing system as described in claim 1, wherein at least one hole for routing the electrical leads is provided in a side of the conduit (wire chase 240). (See Figure 6B)

Heckeroth does not specifically teach the hole is defined in the bottom side of the conduit.

Wagner et al. teach the hole is defined in the bottom side of the conduit. (See Figure 8A).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth by defining a hole in the bottom side of the conduit for routing electrical leads as taught by Wagner et al., because defining a hole in the bottom side or any other sides of the conduit is a matter of design choice.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Ansley et al. (US Patent 6295818).

Heckeroth discloses an integrated roofing system as described in claim 1.

Heckeroth does not specifically teach the module attached to the top surface of the flexible membrane with an adhesive.

Ansley et al. teach the module attached to the top surface of the flexible membrane with an adhesive. (See Abstract or Summary)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth by attaching the photovoltaic module to the top surface of the flexible membrane with an adhesive as taught by Ansley et al., because it would reduce the need for additional mounting structure. (See Summary of Ansley et al.)

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849).

Regarding claim 14, Heckeroth discloses an integrated photovoltaic roofing system as described in claim 1. Heckeroth teaches the elongated photovoltaic module 10 is flexible and roll-able into a spool as seen in Figure 8. Heckeroth also teaches the roofing material is flexible as described in paragraph [0054]. Heckeroth does not specifically teach the flexible membrane and the flexible modules attached to the flexible membrane can be rolled upon themselves. However, it would have been

obvious to one having ordinary skill in the art at the time the invention was made to have the flexible membrane and the flexible modules rolled upon themselves, because they are both flexible and roll-able.

7. Claims 17, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Wagner et al. (US Patent 5164020).

Regarding claims 17, 20 and 22, as seen in Figures 1A, 2, 5A-F, 6B, 10A-D, Heckeroth describes an integrated photovoltaic roofing system for attachment to a roofing surface, comprising a flexible membrane (24) having a top surface and a bottom surface, the bottom surface for application to the roofing surface; a plurality of elongated photovoltaic modules (10) arranged side-by-side and attached to the top surface of the at least one flexible membrane, each of the modules comprising a plurality of solar cells and a pair of electrical leads (14, 16), each of the electrical leads of the electrical lead pairs having one end connected to one of the modules and having a connector (238) attached to a free end; and at least one conduit (wire chase 240) located at adjacent ends of the modules. Heckeroth also describes the wires are routed through holes in the wire chases 240 and 250. As seen in Figures 2 to 3A-B, Heckeroth teaches the photovoltaic modules (10A, 10B) attached to each other by adhesive 20A in Figure 2 and to the flexible membrane (24) and roofing surface (22) by screw 32 and clamping strip 30. Therefore it is the Examiner's position that Heckeroth does teach the plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at

least one flexible membrane to form an integrated unit for attachment to the roofing surface.

Heckeroth does not specifically teach a plurality of holes are defined in at least one side of the at least one conduit.

Wagner et al. teach forming a hole in the bottom side of the wiring duct 41 (or conduit) for the wire 50 of the photovoltaic module 15 as shown in Figures 8A-B. Wagner et al. also teach the roofing system comprising a plurality of module 15 as shown in Figure 2. Therefore, Wagner et al. teach forming a plurality holes in the bottom side of the wire duct 41.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth by forming plurality of holes in one side of the conduit as taught by Wagner et al., because it would accommodate more wires into the conduit. In addition, the instant limitation of “a plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at least one flexible membrane to form an integrated unit for attachment to the roofing surface” would obviously have been present once there are plurality of photovoltaic modules attached together and to the top surface of the flexible membrane.

8. Claims 18-19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Wagner et al. (US Patent 5164020) and further in view of Garvison et al. (US Patent 6111189).

Heckeroth and Wagner et al. disclose an integrated roofing system as described in claim 17.

Neither Heckeroth nor Wagner et al. specifically teach a plurality of electrical leads having connectors attached to each end.

With respect to claim 18, Garvison et al. teach having connectors (270,272 or 278, 280 in Figure 11...) attached to each end of electrical leads (266 or 274). (See Figures 11-16)

With respect to claim 19, Garvison et al. teach the connectors are inside the conduit (or electrical wire raceway 202). (See Figure 2, col. 3 lines 5-13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth and Wagner et al. by providing connectors to each end of electrical leads inside the conduit (or electrical raceway) as taught by Garvison et al, because it would allow easy accessibility and maintenance (See col. 6 lines 20-24).

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Wagner et al. (US Patent 5164020) and further in view of Sasaoka et al. (US Patent 6462265).

Heckeroth and Wagner et al. disclose an integrated roofing system as described in claim 17.

Neither Heckeroth nor Wagner et al. teach the electrical lead being soldered to an electrical connector on a top surface of the module.

Sasaoka et al. teach the electrical leads (1062) having one end soldered to an electrical connector (copper tab) on top of the module (See Figure 16 and col. 24 lines 5-14)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth and Wagner et al. by soldering one end of electrical leads to the photovoltaic module as taught by Sasaoka, because it is a way to make an electrode lead-out unit. (See col. 24 lines 5-14).

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckeroth (PGPub 20020129849) in view of Sasaoka et al. (US Patent 6462265)

Regarding claim 24, Heckeroth discloses an integrated roofing system as described in claim 23.

Heckeroth does not specifically teach the electrical lead ends connected to one of the modules are soldered to an electrical connector on a top surface of the modules.

Sasaoka et al. teach the electrical lead ends connected to one of the modules are soldered to an electrical connector on a top surface of one of the modules. (See Figure 16 and col. 14 lines 5-14)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Heckeroth by soldering electrical leads ends to an electrical connector on a top surface of the modules as taught by Sasaoka et al., because it is a way to make an electrode lead-out unit. (See col. 24 lines 5-14).

***Response to Arguments***

Applicant's arguments filed 1/28/2008 have been fully considered but they are not persuasive.

Applicant argues that Heckeroth does not teach the photovoltaic modules are attached to the top surface of the flexible membrane "to form an integrated unit for attachment to the roofing surface." However, the argument is not persuasive. As seen in Figures 2 to 3A-B, Heckeroth teaches the photovoltaic modules (10A, 10B) attached to each other by adhesive 20A in Figure 2 and to the flexible membrane (24) and roofing surface (22) by screw 32 and clamping strip 30. Therefore it is the Examiner's position that Heckeroth does teach the plurality of photovoltaic modules arranged side-by-side and attached to the top surface of the at least one flexible membrane to form an integrated unit for attachment to the roofing surface.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh-Truc Trinh whose telephone number is 571-272-6594. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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